Dewatering Equipment

Enabling Objectives:

- Identify the capabilities and uses of installed drainage
- Identify the capabilities and uses of portable dewatering equipment
- Rig and use a peri-jet eductor to dewater a flooded compartment.
- Note: All objectives are in accordance with NSTM 079 Vol. 2, NWP 3-20.31, COMNAVSURFPACINST 3541.4B, COMNAVSURFLANTINST 3541.1C, NSTM Chapter 555, NSTM 079 Vol. 3

Drainage and Flushing Systems

- Definition: Systems of piping onboard ships, with or without plumbing facilities, installed for removing waste and flooding water from within the hull.

Principle Drainage Systems:

- Main drainage
- Secondary drainage
- Plumbing and deck drains

Main drainage

- Serves all main machinery spaces
  - Note: On some ships, it may extend forward and aft of the machinery compartment.
- Drains machinery space bilges
- Drains floodable voids
- Drains fuel tanks ballasted with sea water

Main drainage (cont.)

- Pumps
  - Steam driven reciprocating (older ships)
  - Turbine or motor driven centrifugal
  - Eductors (jet pumps)

Secondary drainage

- Drains spaces forward and aft of the main machinery spaces
- The secondary drainage system is an independent system with it’s own pumps and eductors

Secondary drainage (cont.)

- Pumps
  - Electrical motor driven centrifugal
  - Eductors (jet pumps)
  - Portable electric submersible pumps

Plumbing and deck drains

- Provided to drain compartments within the ship by gravity. Gravity drainage piping is installed most extensively in compartments above the waterline

Weather deck drains

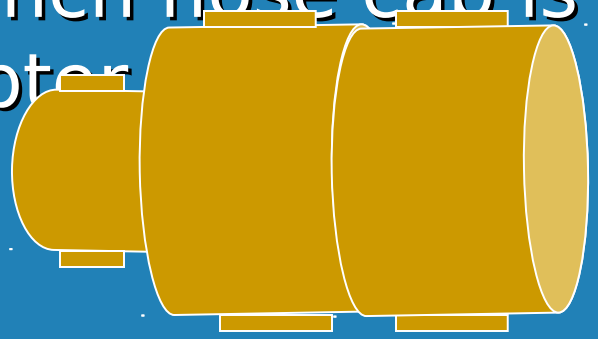
- Flooding danger exists with gravity type drains. Such piping usually pierces the skin of the ship and passes through the watertight decks. As a damaged ship lists to one side or settles more deeply, water will flow back through drainage piping.

Overboard discharge connection

- Allows for discharge of liquids through the hull of the ship
- Located on the damage control deck and as close to the damage control deck as possible
- Located on both port and starboard sides, and through the hull of each main transverse subdivision
- Made flush with the outer hull surface

Overboard discharge connection (cont.)

- Size and type:
  - Inboard end has a 4 inch female swivel hose connection attached to a 4 inch male-2 1/2 inch female swivel hose adapter coupling
  - A 2 1/2 inch hose cap is attached to the adapter



Drainage of magazines

- All magazines having sprinkler systems have drainage capability
- Magazines located above and adjacent to the weather deck, drain through a check valve installed in the bulkhead to the weather deck

Drainage of magazines (cont.)

- For magazines not located adjacent to the weather deck, overboard drainage is provided through deck drains in the magazine with independent drain piping having a check valve at the shell

Drainage of magazines (cont.)

- Magazines which cannot be drained overboard by gravity are drained by portable pumps, either through overhead access or a drain pipe installed through the bulkhead to an adjacent handling room, access, or passage. The drain pipe is installed in the bulkhead at a point close to the deck and fitted with a hose valve

Portable dewatering equipment

P-100

- The P-100 pump unit is an air cooled, diesel driven, single cylinder, 10 horsepower, portable pump. It’s designed for fire fighting and dewatering
- The pump is designed to provide 100 GPM at 83 PSI while lifting 20 feet. In high lift operations, it will deliver 71 GPM at 62 PSI while lifting 44 feet

P-100 equipment

- 3 inch suction hose
- Foot valve and strainer
- Wye gate
- 1 1/2 inch fire hose
- Vari nozzle
- Exhaust hose
- 1 1/2 inch Vita motivator

Portable electrical submersible pump

- Either a 3 phase AC or a DC motor directly connected to a small, high speed, water cooled centrifugal pump
- Designed to dewater compartments not served by installed drainage systems
- Designed to pump cool fresh water / sea water
  - DFM, JP-5, heavy oil, and Navy distillate can be pumped safely. Refer to owners manual for pumping / cool down times

Sub pump capacities

- 200 GPM at 50 foot static head
- 140 GPM at 70 foot static head
- Maximum suction lift of 20 feet
- Pumps may be used in tandem to reduce the risk of pump damage and to increase suction lift
  - Energize lowest pump first

Sub pump safety precautions

- Operator must wear 7500 volt gloves when energizing pump.
- Use the double braided nylon rope to raise and lower the pump. NEVER use the electical cord!!
- The pump can be operated safely with personnel in the space.
  - 3 things must happen for electric shock to occur:
    - Motor must ground out, ground wire must be severed, personnel must physically touch the pump

Sub pump safety precautions (cont.)

- Keep discharge hose free of kinks and sharp bends that will restrict flow. Back pressure will rupture motor seals.
- Always use strainer and keep it clear of debris.
- Keep suction lift and discharge head as low as possible.
- Keep the suction end of the pump in water while the pump is operating.

Portable eductors

- Used for dewatering operations which involve petroleum products or any type of fuel

2 types of eductors

- Peri jet
- 1 1/2 x 2 1/2 single jet (s-type)
  - Both are actuated through a fire hose by firemain pressure or from the discharge a P-100 pump.

Eductors (cont.)

- Rule of thumb: The amount of water you put into it is what you'll pump out of the space.
- Example
  - Water inlet to eductor is 100 GPM
  - Water removed from space is 100 GPM
  - Total discharge is 200 GPM

Review and summary

- Types of drainage
  - Main drainage
  - Secondary drainage
  - Plumbing and deck drains
- Overboard discharge connections
- Drainage of magazines

Review and summary (cont.)

- Emergency drainage equipment
  - Portable P-100 pump
  - Portable electric submersible pump
  - Portable eductors
    - Peri jet
    - S-type

THE END!!!